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Service

**National Wildlife
Research Center**

Wildlife Services Seeking Solutions Through Research

Understanding and Managing Fish-Eating Birds at Aquaculture Facilities in the Southeastern United States

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National Wildlife Research Center Scientists Address Aquaculture Losses

Wildlife Services' (WS) National Wildlife Research Center (NWRC) is the only Federal research facility devoted exclusively to resolving conflicts between people and wildlife through the development of effective, selective, and acceptable methods, tools, and techniques. NWRC's field station in Starkville, MS, is uniquely located and designed to address problems associated with fish-eating birds on aquaculture stocks.

In the past 25 years, fish-eating birds have had a substantial economic impact on aquaculture production. Aquaculture industry costs associated with bird damage and damage prevention are estimated to exceed $17 million annually. Current research is aimed at gaining information about the abundance and foraging behavior of fish-eating birds, and the economic impacts associated with these birds and their diseases at aquaculture facilities in the Southeastern United States. This information will help to develop new damage management techniques. In addition, both captive and field studies are being conducted to provide valuable insight into the ecology of these migratory birds. The goal of NWRC's research is to determine the impact fish-eating birds are having on aquaculture production, and to develop methods to reduce depredation of Southeastern catfish, bait fish, and crawfish.

Major Research Accomplishments:

- WS documented the impact of cormorants on the catfish industry. This research was used to develop a Standing Depredation Order and an Environmental Impact Statement for a National Cormorant Management Plan.
- WS developed and published a science-based initiative to manage cormorant impacts to southern aquaculture. This document was used as the double-crested cormorant Environmental Impact Statement, which was prepared by the U.S. Fish and Wildlife Service.
- WS demonstrated that low-powered lasers can disperse double-crested cormorants from night roosts adjacent to catfish farms.

Applying Science and Expertise to Wildlife Challenges

Population Trends—NWRC scientists are studying population trends of double-crested cormorants and American White Pelicans, tracking large-scale movements through the use of satellite telemetry, and constructing computer models that describe population dynamics. This research will provide a better understanding of population trends and movements and will be used to evaluate various alternatives for managing double-crested cormorant and American White Pelican impacts to southeastern aquaculture.

NWRC scientists recently evaluated the distribution and abundance of double-crested cormorants at catfish aquaculture ponds in the Delta region of Mississippi. Cormorants were observed foraging on more than 25 percent of the ponds that were surveyed aerially from February through April in 2001. The average number of cormorants on each pond ranged from 5 to more than 46, depending on the month. Using this data, NWRC scientists will relate the distribution and abundance of cormorants to types and conditions of the ponds, and the health of the fish in the ponds. This study is providing a biological basis for estimating economic losses caused by cormorants.

Biology and Impact of Fish-Eating Birds on Aquaculture—An understanding of the biology of fish-eating birds and their economic impacts on aquaculture will enable the successful application of various management strategies. For example, given the feeding preferences of double-crested cormorants, American White Pelicans, great blue herons, little blue herons, and great egrets, NWRC researchers are working to develop economic threshold predictions to determine their impacts on aquaculture production. These studies may enable the development of a predictive model and subsequent simulations of regional and flyway-based management of fish-eating birds.

The fundamental ecology of American white pelicans remains poorly understood. NWRC researchers have studied pelican populations in Louisiana and Mississippi since 1993, and have banded pelicans at their predominant breeding colonies in North Dakota and Minnesota since 1996. To supplement these efforts, NWRC researchers initiated a breeding population study at Chase Lake, ND, in July 2000, to estimate age-specific survivorship and reproductive success of American white pelicans. A controlled foraging experiment was also recently completed to determine the number of catfish consumed by pelicans in captivity. Daytime and nocturnal observations revealed that pelicans actively forage during day and night hours. One pelican consumed 20 catfish in 69 minutes. This same pelican also consumed 47 catfish between 4 p.m. and 10 p.m. by actively foraging during each hour of the observation period. These data will be used to develop bioenergetic and economic predictions regarding the foraging ecology of pelicans and their impact on aquaculture facilities in the mid-South.

Nonlethal Methods for Reducing Damage to Aquaculture—As part of an integrated approach to reduce the impact of fish-eating birds on Southeastern aquaculture, several nonlethal tools have been developed. Field studies recently documented the effectiveness of low-powered lasers for dispersing double-crested cormorants from night roosts near aquaculture facilities while minimizing disturbances to waterfowl and other non-target species.

American White Pelican Disease Ecology—NWRC researchers, in collaboration with parasitologists at two State universities, have initiated a study to determine the species of trematode currently infecting commercially-grown catfish in the mid-South, and to determine if fish-eating birds can serve as hosts for this parasite. Biologists at NWRC's Mississippi field station artificially infected 4 captive American white pelicans with larvae of candidate Diplostomula spp. trematodes that were isolated from infected catfish collected from commercial ponds. Adult specimens of this parasite were later found in three of the four pelicans, indicating that American white pelicans definitely have the potential to transmit this disease among catfish ponds. Morphology of whole specimens, sections of the specimens, and molecular analyses of this DNA are being used to identify the trematode species. No other parasites were present in the test subjects. An additional study is planned to investigate the potential of double-crested cormorants and great blue herons to serve as hosts for these trematodes.

Groups Affected by These Problems:

- Aquaculture producers, distributors, retailers

Selected Publications:

- Blackwell, B.F., M.A. Stapanian, and D.V.C. Weseloh. 2002. Dynamics of the double-crested cormorant population on Lake Ontario. *Wildlife Society Bulletin* 30(2):345-353.
- Glahn, J.F., B. Door, J.B. Harrel, and L. Khoo. 2002. Foraging ecology and depredation management of great blue herons at Mississippi catfish farms. *Journal of Wildlife Management* 66(1):194-201.
- Glahn, J.F., and B.S. Dorr. 2002. Captive double-crested cormorant *Phalacrocorax auritus* predation on channel catfish Ictalurus punctatus fingerlings and its influence on single-batch cropping production. *Journal of the World Aquaculture Society* 33(1):85-93.
- Tobin, M.E., D.T. King, B.S. Dorr, S.J. Werner, and D.S. Reinhold. 2002. Effect of roost harassment on cormorant movements and roosting in the Delta Region of Mississippi. *Waterbirds* 25(1):44-51.
- King, D.T. and S.J. Werner. 2001. Daily activity budgets and population size of American White Pelicans wintering in south Louisiana and the Delta region of Mississippi. *Waterbirds* 24:250- 254.
- Werner, S.J., M.E. Tobin, and P.B. Fioranelli. 2001. Great egret preference for catfish size classes. *Waterbirds* 24:381-385.
- Glahn, J.F., G. Ellis, P. Fioranelli, and B.S. Dorr. 2001. Evaluation of moderate- and low-powered lasers for dispersing cormorants from their night roosts. Pp. 34-45 In Proceedings of the Ninth Wildlife Damage Management Conference. State College, Pennsylvania, October 5-8, 2000.
- Glahn, J.F., D.S. Reinhold, and C.A. Sloan. 2000. Recent population trends of double-crested cormorants wintering in the Delta region of Mississippi: Responses to roost dispersal and removal under a recent depredation order. *Waterbirds* 23:38-44.
- Glahn, J.F., M.E. Tobin, and B.F. Blackwell. 2000. A science- based initiative to manage double-crested cormorant damage to southern aquaculture. *APHIS Technical Bulletin* 11-55-010.